CLAIMS

1. A method of studying the infectivity of a pathogen in tissues comprising the steps of:

isolating host cells;

placing said isolated host cells into a bioreactor comprising culture medium;

applying sedimental shear stress to the cells in the cell culture to form a three-dimensional tissue mass;

seeding the formed tissue mass in a tissue culture vessel;

introducing an infectious pathogen into said three-dimensional mass; and

assaying the infectivity of said infectious pathogen.

2. The method of claim 1, optionally comprising a culture matrix that facilitates the growth of said host cells.

3. The method of claim 1, wherein the bioreactor is a rotating wall vessel.

4. The method of claim 1, wherein said isolated host cells are epithelial cells.

5. The method of claim 4, wherein said epithelial cells are human intestinal cells.

6. The method of claim 2, wherein said culture matrix consists of microbeads or microcarriers.

7. The method of claim 1, wherein said infectious pathogen is selected from the group consisting essentially of viruses, bacteria, protozoa, parasites and fungi.

8. The method of claim 7, wherein said infectious pathogen is *Salmonella typhimurium*.

9. The method of claim 1, wherein said culture medium comprises fetal bovine serum and a tri-sugar based medium selected from the mixtures of the group consisting of fructose, galactose and lactose.

10. The method of claim 6, wherein said microbeads are collagen-coated microbeads.

11. A method of studying the infectivity of a pathogen in tissues comprising the steps of:

isolating intestinal epithelial cells;

placing said intestinal epithelial cells into a bioreactor comprising culture medium;

applying sedimental shear stress to the cells in the cell culture to form a three-dimensional tissue mass;

seeding the formed tissue mass in a tissue culture vessel; and,

introducing an infectious pathogen to the formed tissue mass.

12. The method of claim 11, wherein said infectious pathogen is *Salmonella typhimurium*.

13. A method of measuring the chemosensitivity of tissues to a toxic materials comprising:

isolating host cells;

placing said isolated host cells into a bioreactor comprising culture medium;

applying sedimental shear stress to the cells in the cell culture to form a three-dimensional tissue mass;

seeding the formed tissue mass in a tissue culture vessel;

introducing a toxic material into said three-dimensional tissue mass; and

assaying the chemosensitivity of said toxic material.

14. The method of claim 13, optionally comprising a culture matrix that facilitates the growth of said host cells.

15. The method of claim 13, wherein said isolated host cells are epithelial cells.

16. The method of claim 15, wherein said epithelial cells are human renal cells.

17. The method of claim 14, wherein said culture matrix consists of microbeads or microcarriers.

18. The method of claim 17, wherein said microbeads are collagen-coated microbeads.

19. The method of claim 13, wherein said toxic material is a chemotherapeutic material.

20. The method of claim 19, wherein said chemotherapeutic material is an antibiotic.

21. The method of claim 20, wherein said antibiotic is gentamicin.

22. The method of claim 13, wherein said culture medium comprises fetal bovine serum and DMEM/F12.

23. A method of measuring the chemosensitivity of tissues to a toxic materials comprising:

isolating human renal epithelial cells;

placing said isolated human renal epithelial cells into a bioreactor comprising culture medium;

applying sedimental shear stress to the cells in the cell culture to form a three-dimensional tissue mass;

seeding the formed tissue mass in a tissue culture vessel;

treating the three dimensional tissue mass with a toxic material; and

assaying the chemosensitivity of said toxic material.

24. The method of claim 23, wherein said toxic material is a chemotherapeutic material.

25. The method of claim 24, wherein said chemotherapeutic material is an antibiotic.